



TITLE:

A coil Current Stabilizer

AUTHOR(S):

Azuma, Toshio; Tsumori, Kunihiro; Kimura, Kiichi

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4. A Coil Current Stabilizer

Toshio AZUMA, Kunihiro TSUMORI and Kiichi KIMURA

(K. Kimura Laboratory)

We have constructed the current stabilizer for a thin lens coil beta-ray spectrometer, which needs the maximum exciting current of 10 A. The design of the circuits is the same as those described by Lawson and Tylor (*Rev. Sci. Inst.*, **10**, 304 (1939)), except that 6SN7 and photocell 17GT-1 were used in place of 6C5 and photocell 920, and that 5 Henry choke coil and 500 μ . f. chemical condenser were used to eliminate ripple voltage in the motor generator set. No ripple voltage was detected by the oscilloscope. The stabilization ratio of this circuit could be increased by the increase of the gain of the direct coupled amplifier, which was attained only by the change of the load resistance of the oscillator tube. The direct coupled amplifier could be constructed in a compact case (220×365×200 mm.) by the use of 6SN7.

The performance of the stabilizer has been very satisfactory. The coil current of the spectrometer has been stabilized at the rate of one part in 50,000 over a period of an hour, and it was so easy to handle that the coil current could be shifted to a new stabilized value within 10 seconds.

5. The Probable Energy Loss of Electrons in Matter

Toshio AZUMA, Kunihiro TSUMORI and Kiichi KIMURA

(K. Kimura Laboratory)

Using a double-coil thin lens magnetic beta-ray spectrometer, the probable energy loss of electrons in passing through thin Mica, Al, Cu, Zn, Ag, Cd, and Sn has been measured. For the monochromatic electrons, the photo-conversion lines produced in a lead radiator by the 0.3499 Mev and 0.6067 Mev gamma-rays of Ra, 1.114 Mev gamma-ray of Zn^{65} , and 1.3315 Mev gamma-ray of Co^{60} , are used.

If we set an absorber foil just before a lead radiator, the peak displacement of the photo-conversion lines shows the probable energy loss in passing through the absorber. Attention was given to the effect of the Compton electrons radiated from the absorber. The peak shifts are shown in Table 1. (B-W-M), (B-B), and (L) in the table mean the calculated values of the stopping power $I\left(=\frac{\Delta(H\rho)}{\mu}\right)$, using the formula of Bohr-White-Millington, Bethe-Bloch, and Landau (*J. Phys. U. S. S. R.* **8**, 201 (1944)) respectively.

The results indicated that the probable energy loss of electrons of medium low energy as β_1 and β_2 , shows agreement with the Bohr formula within